

2507/307

**AUTOMATIC PILOT SYSTEMS AND
AIRFIELD SAFETY AND PROCEDURES III**

Oct./Nov. 2018

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**DIPLOMA IN AERONAUTICAL ENGINEERING
(AVIONICS OPTION)**

MODULE III

AUTOMATIC PILOT SYSTEMS AND AIRFIELD SAFETY AND PROCEDURES III

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments.

*This paper consists of **EIGHT** questions in **TWO** sections; **A** and **B**.*

*Answer **THREE** questions from section **A** and **TWO** questions from section **B** in the answer booklet provided.*

All questions carry equal marks.

Maximum marks for each part of a question are as indicated.

Candidates should answer the questions in English.

This paper consists of 3 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A: AUTOMATIC PILOT SYSTEMS

Answer **THREE** questions from this section.

1. With the aid of a labelled block diagram, explain the function of each autopilot signal input in a closed inner loop. (20 marks)
2. (a) With the aid of a labelled sketch, describe a spring tab. (8 marks)
(b) With the aid of a labelled sketch, show the operation of a servo tab. (8 marks)
(c) Describe a manual aircraft flying control trim system. (4 marks)
3. (a) Outline **four** sources of common-mode failures likely to occur in autopilot systems. (4 marks)
(b) Explain how each of the following diagnostic tools are used for troubleshooting autopilot systems:
(i) diagnostic checks;
(ii) error detection;
(iii) reversal checks (analytical redundancy);
(iv) structural checks. (16 marks)
4. Discuss the concept of operation of an automatic flight control system. (20 marks)
5. Describe the construction and operation of each of the following automatic flight system components:
(a) air navigation computer; (13 marks)
(b) one-channel computer. (7 marks)

SECTION B: AIRFIELD SAFETY AND PROCEDURES III

Answer *TWO* questions from this section.

6. With reference to KCARs part VII on crash and rescue, discuss:
- (a) regulation (56), and sub-section (1), (2), (3), (4) and (5) detailing the requirements for first aid and emergency medical kit; (10 marks)
 - (b) regulation (45), and sub-regulation (1), (2) and (3) detailing the aircraft emergency lighting equipment. (10 marks)
7. Explain what happens if an aircraft part issued is found to be defective. (2 marks)
- (b) Discuss the difference between the functions of a quarantine store and a bonded store as applied in aviation. (10 marks)
 - (c) Explain how consumable items are handled in the aviation industry. (4 marks)
 - (d) Explain the process of returning a defective component removed from an aircraft to the manufacturer for repair. (4 marks)
8. A state which has a special interest in an accident by virtue of fatalities or serious injuries to its citizens shall upon making a request to do so, be permitted by the state conducting the investigation to appoint an expert. Outline the entitlements of such an appointee. (5 marks)
- (b) Explain what the investigation authority must do upon arrival at the accident scene. (15 marks)

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